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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,679	06/25/2003	Timothy Olson	0543.002	3760

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EXAMINER

ROGERS, DAVID A

ART UNIT	PAPER NUMBER
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2856

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/603,679	Applicant(s) OLSON, TIMOTHY	
	Examiner David A. Rogers	Art Unit 2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8, 11-15, 18, 19, 22-27, 30 and 32 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 9, 10, 16, 17, 20, 21, 28, 29 and 31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20030625</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 24, 26, and 32 rejected under 35 U.S.C. 102(e) as being clearly anticipated by United States Patent 6,686,752 to Heumann *et al.*

Huemann *et al.* discloses a cyclone separator comprising a liner (reference item 38) with imbedded conductors (reference item 36) connected to a monitoring device (reference item 40) such that the wearing of the liner and the conductors provides an indication of the wear of the cyclonic separator.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 6, 7, 11-14, 18, 22-26, 30, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Purvis *et al.* in view of Minor *et al.* and Heinzen.

Purvis *et al.* discloses a wear detection sensor comprising an electrically insulating material (reference item 20) forming an opening (reference item 14) through which a fluent material can pass. The sensor further comprises electrical conductors (reference items 28, 30, 32, 34, and 36) with wearable portions (reference items 28A, 30A, 32A, 34A, and 36A). As seen in figure 3 the wearable portions of the conductors are each connected to electrical leads (reference items 28B, 28C, 30B, 30C, 32B, 32C, 34B, 34C, 36B, and 36C). The inner leads are pass through the outer leads for each wearable portion. The conductors and their wearable portions are imbedded in the insulating material.

Over time the electrically insulating material and wearable portions of the conductors are worn away. The wearing away of the conductors causes a discernable change in conductivity. By monitoring the plurality of conductors *in situ* Purvis teaches that predictions can be made as to component/system failure as a function of time (column 2, lines 28-36 and figure 8) without the need for halting the system (column 3, lines 47-52). Finally, Purvis *et al.* teaches that the wear monitoring apparatus can be utilized in various forms including other structures and materials which are subjected to the effects of wear, erosion or corrosion, such as a pressure vessel in which caustic fluids

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are contained, *lines*, vessels, *cyclones*, deflectors, chutes, nozzles and other wear and erosion prone areas of either refractory, ceramic, plastic, *rubber* or other like materials.

Purvis *et al.*, however, does not expressly teach the use of electrical conductors formed as concentric rings surrounding an opening through which a fluent material passes. Purvis *et al.* does teach that the wearable portions can be curved or shaped to conform to match the geometry of the flow stream surface (column 5, lines 27-33). Furthermore, Minor *et al.* teaches that seals are prone to corrosion and/or wear. Specifically, Minor *et al.* teaches:

Likewise, seals between component parts should be periodically checked for leakage which may indicate cracks or wear in the gasket. Such inspections may be important to avoid a catastrophic gasket failure during normal operation and all the costs inherent in such a failure, such as potential equipment damage, excessive down-time, and costly and possibly dangerous leaks and spills. Additionally, the replacement of gaskets is often an important reason for scheduled maintenance procedures, with the schedule of frequent maintenance sometimes being a function of anticipated timing for gasket replacement.

Clearly, from the teachings of Minor *et al.* one would be motivated to, and indeed does monitor the condition of the seal in order to prevent catastrophic failure which will, among other things, increase repair costs.

Minor *et al.* further shows a seal (reference item 10) (figures 1 and 2) located between two sections of conduit with flanges (reference items 32 and 34). The seal comprises is formed of an electrical insulating material and has an imbedded electrical conductor (reference item 18). The conductor forms an almost complete loop, except for a small gap where the ends are connected to leads (reference items 20 and 22). The leads are further connected to a

monitoring device (reference item 24). Minor *et al.* also teaches that the seal can be composed of various elastomers such as Viton fluoroelastomer, nitrile rubber, ethylene-propylene-diene monomer (EPDM) rubber, or various fluoropolymers such as polytetrafluoroethylene (PTFE), expanded PTFE (ePTFE)), fluorinated ethylenepropylene (FEP), perfluoroalkoxy polymer (PFA), and polyvinylidene fluoride (PVDF).

Any fluent material that is caustic or contains abrasives (slurries, salt water, etc.) will inherently abrade the inner surface of the conduit and the seal disclosed by Minor *et al.* Therefore, while Minor *et al.* teaches that it is also known to monitor the seal, via the electrical conductor, for strain, it is also inherent that the seal and the conductor themselves will wear over time. Eventually the conductor will wear through, and the monitor will note the lack of electrical continuity.

To further support this, Heinzen teaches an electrically insulating seal (reference item 17). Similar to that shown in Minor *et al.*, the seal of Heinzen has an imbedded electrical conductor (reference item 18). This conductor, too, forms an almost complete loop, except for a small gap where the ends are connected to leads (reference items 23 and 24). These leads are also connected to a monitor (figure 5). Heinzen clearly teaches that over time the insulating material is worn away. Eventually the electrical conductor is worn away (reference item 22) (figure 5). The monitor is used to detect the pending seal failure prior to the seal actually failing.

Forming the wearable portions of the electrical conductors of Purvis *et al.* (reference items 28A, 30A, 32A, 34A, and 36A from figure 2 or reference item 26A from figure 7) as concentric loops about an opening would have been obvious in view of the teachings of Minor *et al.* and Heinzen. This would allow the system of Purvis *et al.* to detect the failure at any point around the opening, not just at a single location, since the entire opening is subject to wear and erosion.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Purvis *et al.* with the teachings of Minor *et al.* and Heinzen to provide a seal, such as one made of rubber, with one or more concentric electrical conductors imbedded in the seal in order to monitor the wear and/or predict the failure of the seal before catastrophic failure occurs.

5. Claims 3, 8, 15, 19, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Purvis *et al.* in view of Minor *et al.* and Heinzen as applied to claims 1, 6, 11, 18, and 24 above, and further in view of United States Patent 6,286,471 to Powell.

Purvis *et al.* in view of Minor *et al.* and Heinzen teaches that it is obvious to monitor a seal with an imbedded electrical conductor for wear. In particular, Purvis *et al.* teaches that the material can be formed of rubber. Furthermore, Minor *et al.* teaches that the seal can be composed of various elastomers such as Viton fluoroelastomer, nitrile rubber, ethylene-propylene-diene monomer

(EPDM) rubber, or various fluoropolymers such as polytetrafluoroethylene (PTFE), expanded PTFE (ePTFE)), fluorinated ethylenepropylene (FEP), perfluoroalkoxy polymer (PFA), and polyvinylidene fluoride (PVDF). Purvis *et al.* in view of Minor *et al.* and Heinzen does not teach the use of a material composed of urethane.

The applicant's choice of urethane as the preferred material is a matter of design preference, and is a common choice for seals. See Powell where o-rings (reference item 168) are used that are composed of urethane rubber.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Purvis *et al.* in view of Minor *et al.* and Heinzen with the teaching of Powell to monitor the wearing of seals formed of urethane.

Allowable Subject Matter

6. Claims 4, 5, 9, 10, 16, 17, 20, 21, 28, 29, and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (571) 272-2205. The examiner can normally be reached on Monday - Friday (0730 - 1600).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


22 December 2004


HEZRON WILLIAMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800